**Toxoplasma gondii**

A 30-year-old white woman was brought to the ER with 2-week history of progressively **severe headache, nausea, and vomiting; several seizures** had occurred over the past 2 days.

She had been HIV positive for 3 years and had been diagnosed with **AIDS** a year before. She had been on HIV therapy, but was currently **failing her regimen**. She was also on aerosolized pentamidine because of a Bactrim allergy. Her brother, who brought her to to ED, could not recall any history of seizures.

IMAGING

* MRI shows **ring-ENHANCING lesions** in left parietal lobe and right frontal lobe

DIAGNOSTIC WORK UP

* Cultures of blood and CSF for bacteria and Cryptococcus neoformans
* Serology**: A significantly high titer of IgG specific for T. gondii in a single serum may support diagnosis of T. gondii encephalitis**
* In failed investigation can do Histology of brain biopsy or PCR in CSF or biopsy

DIFFERENTIAL

* Cyptococcus neoforms, Listeria, TB, Nocardia, Primary CNS lymphoma, PML, T. gondii
* Rationale: T. gondii and CNS lymphoma are most common causes of focal brain lesions in those with AIDS. Usually can be differentiated based on lab and radiology (similar clinically). First three organisms more likely to cause meningitis. Other causes are less common and may or may not show ring enhancement. PML does not usually cause mass lesions.

MICROBIOLIGICAL PROPERTIES

* **OBLIGATE INTRACELLULAR PARASITE**
* **Exists in two forms: (1) the proliferative form: banana-shaped tachyzoites in tissues (e.g. CSF) in the active stage )post-reactivation) of a chronic infection or a primary infection and (2) the resting form, slow-growing bradyzoites, is found in muscle and brain during (asymptomatic) chronic infection.**

EPIDEMIOLOGY

* Worldwide minus areas with no cats such as Pacific Islands (cats are the definitive host… sexual stages only occur in cats)
* Oocysts produced in cat intestine are excreted in feces and develop into infectious form. Cattle and pigs feeding on cat feces are intermediate hosts.
* Humans are infected by: (1) ingesting pseudocysts in undercooked meat (2) accidental ingestion of material contaminated with cat feces containing oocysts.
* AIDs and ICH are at risk
* Transplacental crossing of blood-borne parasite (a TORCH infection)

PATHOGENESIS

* **Ingests pseudocysts. Sporozoites released into intestinal tract. Sporozoites transform into tachyzoites which penetrate intestinal mucosa and disseminate to various organs.** (Remember T. gondii is a sporozoan and has an apicomplexan at anterior end that helps with invasion (T. gondii is a sporozoan with non-motile trophozoite along with Plasmodium spp. And C. parvum). Invasion is receptor mediated.
* **Once inside the cells, the INTRACELLULAR organism surrounded by phagosome. Inhibits lysosome fusion and differentiates into tachyzoites and begin to divide rapidly. Dormant bradyzoites though still develop and remain sequestered inn the brain matrix while the immune system remains active** (Note that since T. gondii exist intracellularly and extracellularly, both humoral and CD 8+ T cell-mediated responses are mounted).
  + In patients with AIDs, T. gondii no longer sequestered in the brain matrix; bradyzoite reactivation occurs when CD4+ < 200. Bradyzoites transform into tachyzoites and again evade killing and continue to multiply. **Replicating tachyzoites rupture the brain cells, resulting in focal necrosis**.

TREATMENT

* **Sulfadiazine and pyrimethamine** with or without leucovorin = DOC
* Tx of those with AIDs does not eliminate infection, just reduces severity and length of infection
* Tx if pregnant to reduce transmission and chances of squealae. Most infants with subclinical infection at birth will later develop signs of congenital toxoplasmosis unless treated.

PREVENTION

* Avoid inadequately cooked meat and cat feces
* Pregnant women 🡪 avoid cats
* Serial testing of pregnant women at risk. Also, initial test during first trimester is recommended, with re-testing at 20-22 weeks